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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/470,976	12/23/1999	MOTOH ASAKURA	3007/48504	6843

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CROWELL & MORING LLP
INTELLECTUAL PROPERTY GROUP
P.O. BOX 14300
WASHINGTON, DC 20044-4300

EXAMINER

SCHECHTER, ANDREW M

ART UNIT

PAPER NUMBER

2871

DATE MAILED: 11/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/470,976

Applicant(s)

ASAKURA ET AL.

Examiner

Andrew Schechter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 5 and 6 is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☒ Interview Summary (PTO-413) Paper No(s). 16.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Heads-up display system with optical rotation layers".

Claim Objections

2. Claim 3 is objected to because of the following informalities: "third surface" should be "first surface". Appropriate correction is required.

Response to Arguments

3. Applicant's arguments filed 12 August 2002 and 12 September 2002 have been fully considered but they are not persuasive.

The applicant argues [p. 3-4] that "an absorbing polarizing plate and an optical rotation layer are substantially different in function and are not analogous" [p. 4]. The examiner agrees that these elements are substantially different in function, but believes that it would be obvious to one of ordinary skill in the art to combine the device of *Asakura* with the device of *Kubota*, and that this combination would require the use of an optical rotator, as discussed below.

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Asakura discloses an LCD [6] and a light-polarizing device [7A]. *Asakura* further states that "in case of using the liquid crystal display as the displaying device 6, the light-polarizing plate of the liquid crystal display [an inherent part of the LCD 6] may be set to be directed to generate S-wave, in which the displaying device serves also as the light-polarizing device so that the light-polarizing device [meaning 7A] is unnecessary to be separately used" [col. 5, lines 48-53]. In this case, if we used the LCD of *Kubota* as LCD 6, without a separate light-polarizing device 7A, then the light would come out of LCD 6 polarized at 45° to the vertical. Since *Asakura* requires the light going to the windshield to be S-wave (polarized at 0° to the vertical), it would be obvious to one of ordinary skill in the art to use an optical rotator to rotate the polarization by 45°. Such optical rotators are extremely well-known in the art (a standard TN-LCD has a layer of twisted nematic liquid crystal which performs exactly this optical rotation). So, given the motivation provided by *Kubota* for using the device of *Kubota* with the light polarized at 45°, the examiner believes that claims 1-4 are unpatentable.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Asakura et al.*, U.S. Patent No. 5,999,314 in view of *Kubota et al.*, U.S. Patent No. 5,398,127.

Asakura, in Fig. 2, discloses a very similar device to that of the present Fig. 1 (representing the present claims 1 and 2). *Asakura* shows a display system comprising a transparent plate [1A], a liquid crystal display [6], a light-transmittable reflection film [9], and a first optical rotation layer to rotate polarization by 90° [2]. However, the devices are different in two respects:

A) *Asakura*'s LCD with light-polarizing plate on the output [6 and 7A] produces light at 0° to the vertical axis of the image plane, instead of producing light at 45° to the vertical, and

B) *Asakura* does not disclose a second optical rotation layer, since the light produced by the LCD is already at the desired angle to the vertical.

Kubota discloses [in Fig. 2, as conventional prior art] a twisted nematic LCD having rubbing directions at 45° to the vertical axis of the image plane (this requires the output light of the LCD to be at 45°, due to the nature of the TN device), and motivates this angle for the conventional TN device by saying the "reason that the rubbing directions RD1, RD2 are set at 45 degrees to the gate and source lines 12, 13 is to uniformly adjust the contrast of the image displayed on the entire picture element 14." [col. 2, lines 64-68] Based on this, using a conventional TN-LCD producing light at 45° in the device of *Asakura* would have been obvious to one of ordinary skill in the art.

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However, simply inserting the LCD of *Kubota* into the device of *Asakura* would result in an inoperative device, since *Asakura* requires light polarized at 0° to the vertical to be directed onto the windshield. This is not a subtle point, so it would have been obvious to one of ordinary skill in the art that the polarization angle must be changed by 45° . There are two ways of doing so which are well-known in the art. First, an absorbing polarizer whose axis is aligned at 0° to the vertical would do so, at the cost of discarding half the intensity of the light. Second, an optical rotation layer (acting the same as a layer of twisted nematic liquid crystal in a conventional TN-LCD) would do so, without discarding half the intensity of the light. Motivated by this better efficiency, it would have been obvious to one of ordinary skill in the art to use an optical rotator in the device of *Asakura* in view of *Kubota* to obtain the needed light polarized at 0° to the vertical.

For these reasons, claims 1 and 2 are not patentable. Similarly comparing *Asakura's* Fig. 1 with the present claims 3 and 4 (and the present Fig. 2), claims 3 and 4 are also unpatentable for analogous reasons.

Allowable Subject Matter

6. Claims 5 and 6 are allowed.

The prior art does not teach having the display light with an angle of 45° relative to the vertical axis of the image plane, having the light reflect at Brewster's angle to the observer, and then having the un-reflected beam rotated by an angle of 45° to become

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P polarized light which can then pass out of the transparent plate without reflection.


Claims 5 and 6 are therefore allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (703) 306-5801. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-4711 for regular communications and (703) 746-4711 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Andrew Schechter
November 13, 2002


TOANTON
PRIMARY EXAMINER